



Western Human Nutrition Research Center

Improving the quality of life through nutrition research.

ARS Nutrition Research Highlights

Studies at the Western Human Nutrition Research Center, Davis, CA

- Dietary interventions to reduce inflammation in disease

 - Autoimmune disease

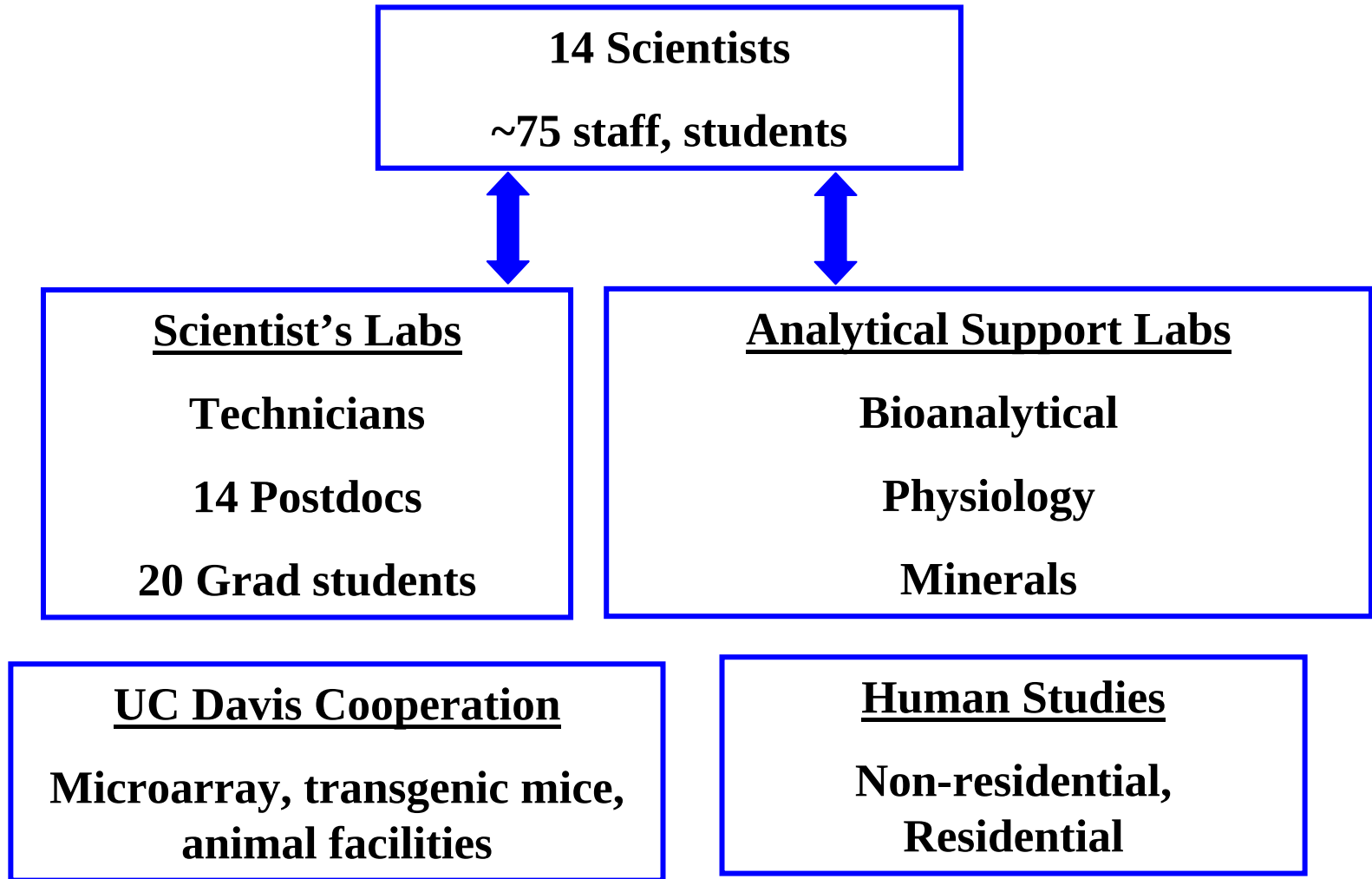
 - Cardiovascular disease

 - Obesity

- Cancer preventive role of grapes or grape components

- Functional studies at the cell and molecular level

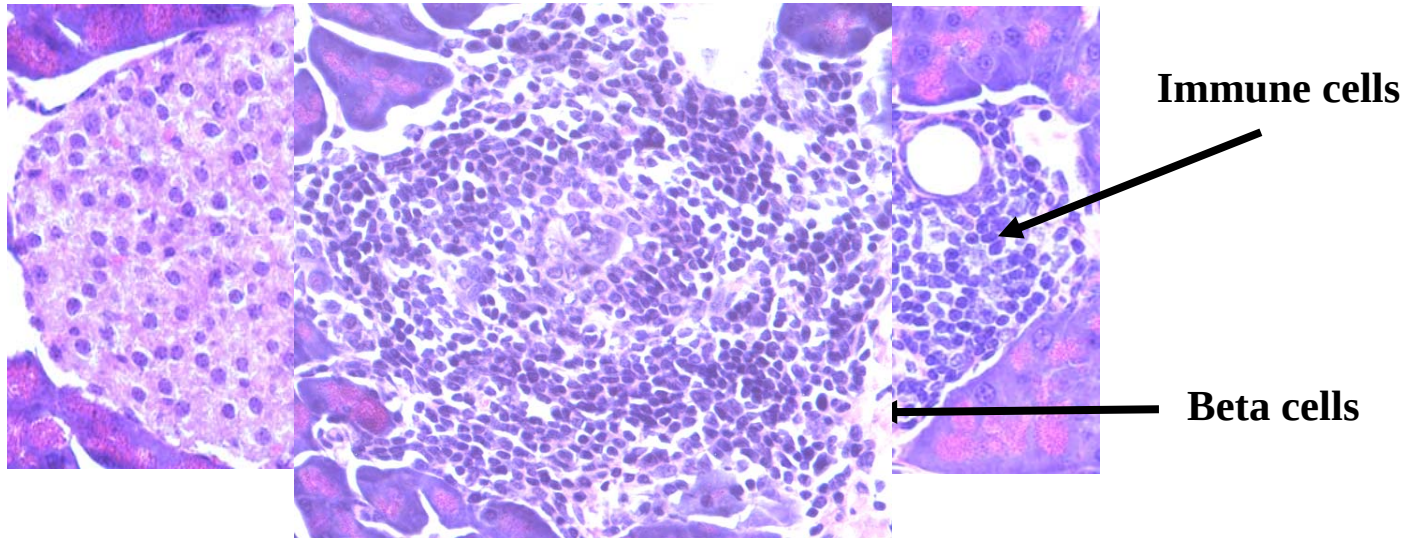
Western Human Nutrition Research Center



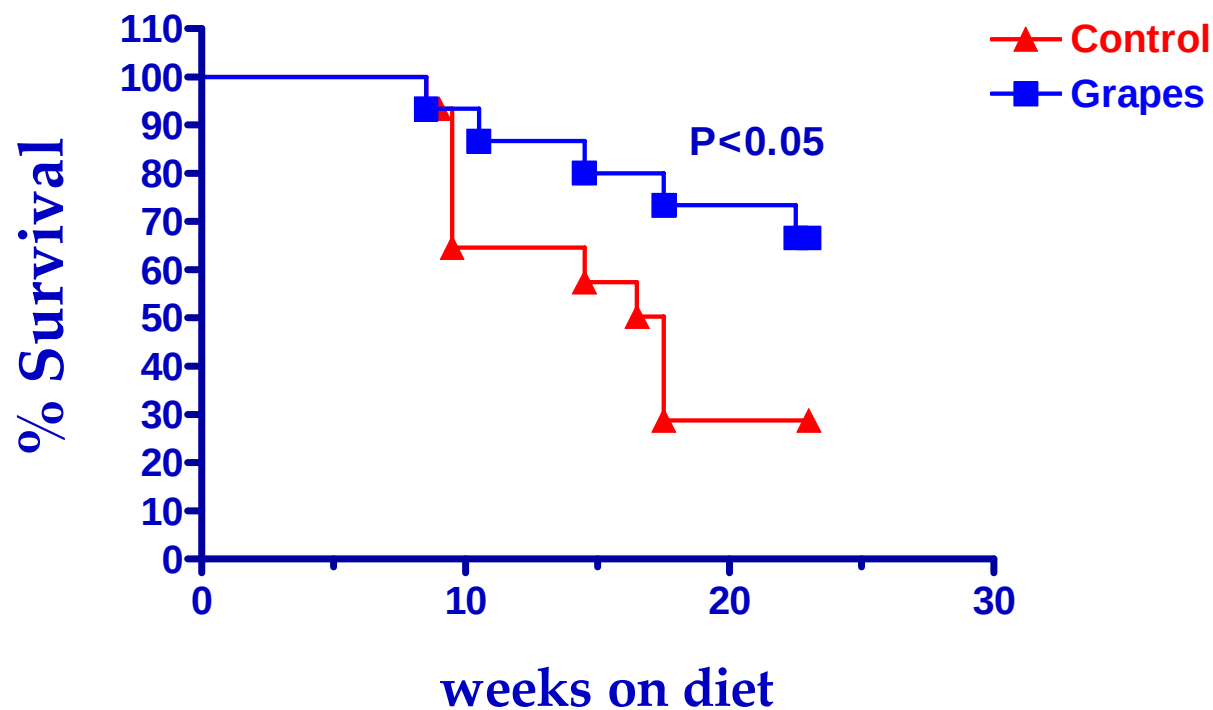
Inhibition of type I diabetes in mice by diet enriched with grapes

J. Nutr. 137: 1216–1221, 2007

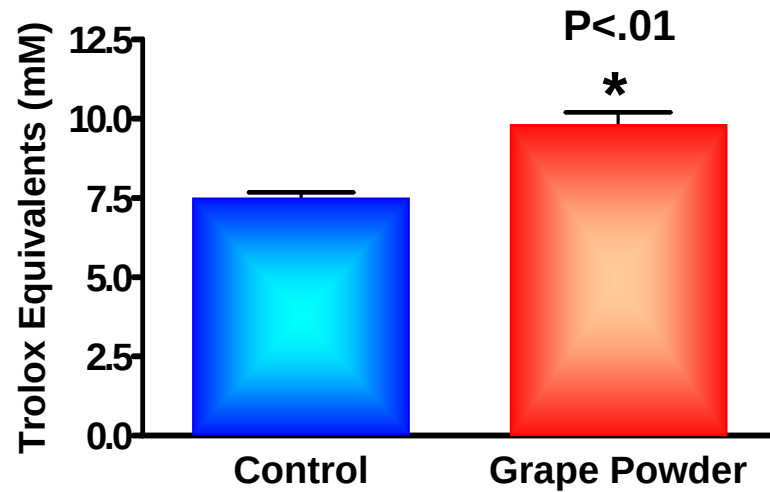
- Type I juvenile diabetes mellitus is an inflammatory autoimmune disease.
- Affects approximately 0.5% of the population in developed countries
- Onset usually occurs in children and young adults.
- Characterized by infiltration of immune cells and progressive destruction of the insulin-producing beta cells in the pancreas



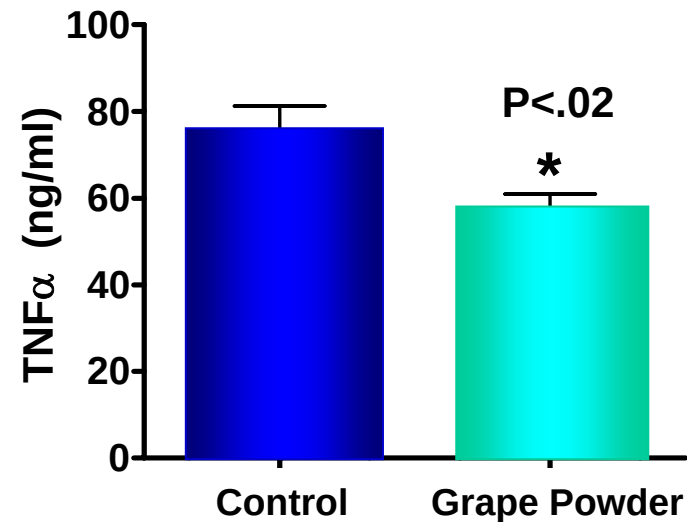
Diet enriched with grape powder inhibited type I diabetes in mice



Antioxidant Capacity Increased in the Serum of Mice Fed the Grape Powder Diet



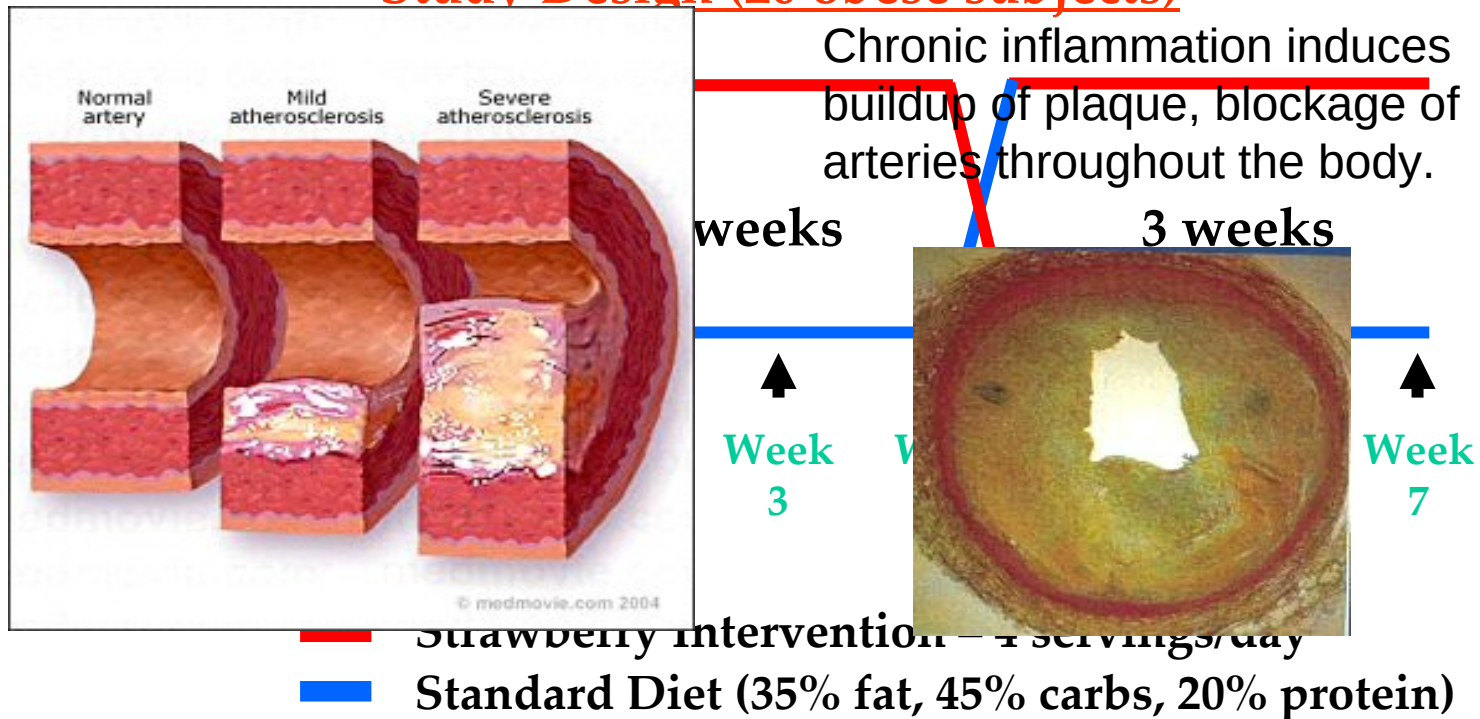
Inflammatory Molecules were
Reduced in Mice Fed Grape Diet



Strawberries and grapes are high in anti-inflammatory phytonutrients.

Do they improve antioxidant status, reduce inflammatory mediators, and alter lipid profiles in obese subjects?

Study Design (20 obese subjects)



Tests at each blood draw

Chemistry panels

Lipids and cholesterol

Lipid particle size (NMR)

Acute phase proteins

Inflammatory molecules

Oxidative stress

Antioxidant status

**Cytokine production,
Activation and
Proliferation status
of immune cells (lymphocytes
and monocytes)**

**DNA microarray analysis –
Effects of strawberries on gene expression
in immune cells**

✧ These tests will determine whether strawberries inhibit the inflammation associated with morbidity in obese individuals. ✧

May work in other chronic inflammatory diseases e.g. lupus, arthritis

Functional Studies with Components of Grapes

Resveratrol:

Activation of Toll-Like Receptors (TLR) causes inflammation.

Resveratrol can suppress TLR-signaling pathways.

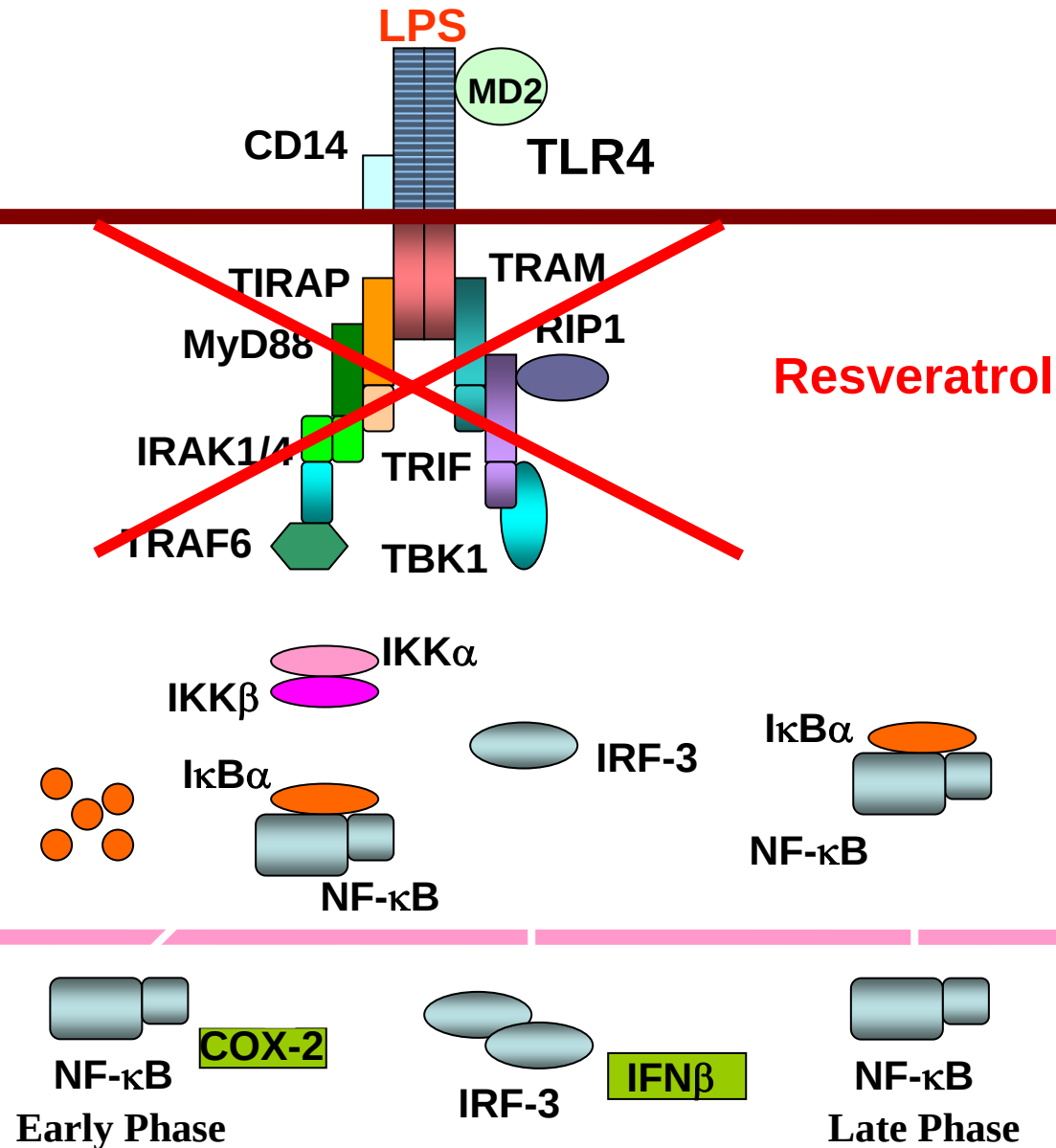
Generation of TLR transgenic mice – use as a model to study relationship between inflammation and cancer

Resveratrol, Quercetin, Anthocyanins:

Kill high-risk leukemia cells in cell culture

Test *in vivo*: inhibit relapse and as a sensitizer to conventional chemotherapeutics

TLR Signaling Pathways



Future Directions/Questions

- Will grape-enriched diets inhibit the inflammation associated with other autoimmune inflammatory diseases?



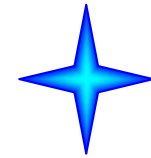
Lupus model

Multiple sclerosis model

- What are the active ingredients responsible for inhibition?
- Can we generate cultivars with higher levels of active components?
- Can grapes inhibit inflammation leading to cancer?
- Can grapes or grape components prevent leukemia or other types of cancers?
- Human studies



Interactions/Collaboration



- Effective research requires strong collaboration between academia, government, industry, agriculture.
- >100 collaborators outside of WHNRC

e.g. in Davis:

- Campus Foods For Health initiative with faculty, equipment, pilot grants, students, medical school
- ARS Western Regional Research Center
- National Clonal Germplasm Repository
- Links with national and regional research centers
- UCD Medical Center, UCD Cancer Center
- Robert Mondavi Institute
- Stakeholders from agriculture and industry
- Lawrence Livermore National Laboratory

Vitis species collection

National Clonal Germplasm Repository, Davis, CA

